

U.S. Patent Application Serial No. 10/511,442  
Amendment filed December 21, 2005  
Reply to OA dated June 21, 2005

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

**Claim 1 (Currently Amended):** A process for producing a synthetic resin foam comprising the step of reacting at least one polyol with at least one polyisocyanate compound in the presence of an organic blowing agent and a catalyst,

wherein the blowing agent being is a mixture comprising 1,1,1,3,3-pentafluorobutane and at least one low-boiling halogen-containing compound,

wherein the organic blowing agent and the polyol mixture forms a premix which is substantially nonflammable;

wherein the at least one low-boiling halogen-containing compound has a relatively low thermal conductivity and a boiling point of about -90 to about 10°C and the thermal conductivity of the halogen containing compounds in the gaseous state is about 8 to about 30 mW/mK at about 1 atmospheric pressure; and

wherein the organic blowing agent further comprises at least one member selected from the group consisting of glycol compounds and amine compounds.

**Claim 2 (Canceled)**

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**Claim 3 (Currently Amended):** The A process according to Claim 1, wherein the organic blowing agent ~~further~~ comprises at least one glycol compound.

**Claim 4 (Canceled)**

**Claim 5 (Currently Amended):** The A process according to Claim 1 ~~or 2~~, wherein the halogen-containing compound has a boiling point lower than the boiling point of HFC-365mfc (40°C).

**Claim 6 (Currently Amended):** The A process according to Claim 1 ~~or 2~~, wherein the halogen-containing compound is nonflammable and has a boiling point of about 10 to about 60°C and a thermal conductivity when it is in the gaseous state of about 8 to about 20 mW/mK at about 1 atmospheric pressure.

**Claim 7 (Canceled)**

**Claim 8 (Currently Amended):** The A process according to Claim 1 ~~or 2~~, wherein the halogen-containing compound is at least one member selected from the group consisting of saturated or unsaturated hydrofluoroethers (HFEs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and fluoroiodocarbons (FICs).

**Claim 9 (Currently Amended):** The A process according to Claim 1 ~~or~~ 2, wherein the halogen-containing compound is at least one member selected from the group consisting of 1,2,2-trifluoroethylene trifluoromethyl ether ( $\text{CF}_2=\text{CFOCF}_3$ ), 1,2,2-trifluoroethylene 1,1,2,2,3,3,3-heptafluoropropyl ether ( $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{CF}_3$ ), perfluoropropyl epoxide ( $\text{CF}_3\text{CF}(\text{O})\text{CF}_2$ ), perfluoro-1-butene ( $\text{CF}_2=\text{CFCF}_2\text{CF}_3$ ), perfluorohexenes ( $\text{C}_6\text{F}_{12}$ ), perfluorononenes ( $\text{C}_9\text{F}_{18}$ ), perfluorohexane ( $\text{C}_6\text{F}_{14}$ ), perfluorocyclobutane (*c*- $\text{C}_4\text{F}_8$ ), iodotrifluoromethyl ( $\text{CF}_3\text{I}$ ), 1,1,1,2,3,3-hexafluoropropane ( $\text{CF}_3\text{CFHCF}_2\text{H}$ ), 1,1,1,3,3,3-hexafluoropropane ( $\text{CF}_3\text{CH}_2\text{CF}_3$ ), 1,1,1,2,3,3,3-heptafluoropropane ( $\text{CF}_3\text{CFHCF}_3$ ), pentafluoroethane ( $\text{CF}_3\text{CF}_2\text{H}$ ), tetrafluoroethanes ( $\text{CHF}_2\text{CHF}_2$ ,  $\text{CF}_3\text{CFH}_2$ ), trifluoromethane ( $\text{CF}_3\text{H}$ ), 1,1,2,2,3,3,4,4-octafluorobutane ( $\text{CF}_2\text{HCF}_2\text{CF}_2\text{CF}_2\text{H}$ ), 1,1,1,2,2,3,4,5,5,5-decafluoropentane ( $\text{CF}_3\text{CF}_2\text{CFHCFHCF}_3$ ), 2-trifluoromethyl-1,1,1,2,3,4,5,5,5-nonafluoropentane ( $\text{C}_6\text{F}_{12}\text{H}_2$ ), 3,3,4,4,5,5,6,6-nonafluoro-1-hexene ( $\text{F}(\text{CF}_2)_4\text{CH}=\text{CH}_2$ ), 2,3,3,4,4,5,5-heptafluoro-1-pentene ( $\text{CH}_2\text{CFCF}_2\text{CF}_2\text{CF}_2\text{H}$ ), trifluoroethylene ( $\text{CF}_2\text{CFH}$ ), 1,1,2,2-tetrafluoroethyl difluoromethyl ether ( $\text{CF}_2\text{HCF}_2\text{OCHF}_2$ ), 1,1,2,2-tetrafluoroethyl methyl ether ( $\text{CF}_2\text{HCF}_2\text{OCH}_3$ ), 2,2,2-trifluoroethyl 1,1,2,2-tetrafluoroethyl ether ( $\text{CF}_3\text{CH}_2\text{OCF}_2\text{CF}_2\text{H}$ ), 1,1,2,3,3,3-pentafluoropropyl methyl ether ( $\text{CF}_3\text{CFHCF}_2\text{OCH}_3$ ), nonafluorobutyl methyl ether ( $\text{C}_4\text{F}_9\text{OCH}_3$ ), 1-trifluoromethyl-1,2,2,2-tetrafluoroethyl methyl ether ( $(\text{CF}_3)_2\text{CFOCH}_3$ ), perfluoropropyl methyl ether ( $\text{CF}_3\text{CF}_2\text{CF}_2\text{OCH}_3$ ), 2,2,3,3,3-pentafluoropropyl difluoromethyl ether ( $\text{CF}_3\text{CF}_2\text{CH}_2\text{OCHF}_2$ ), 1,2,3,3,4,4-hexafluorocyclobutane (*c*- $\text{C}_4\text{F}_6\text{H}_2$ ), 2,3-dichlorooctafluorobutane ( $\text{CF}_3\text{CFCICFCICF}_3$ , boiling point:  $63^\circ\text{C}$ ), 1-chloro-1,1,2,2,3,3,4,4-octafluorobutane ( $\text{CF}_2\text{ClCF}_2\text{CF}_2\text{CF}_2\text{H}$ , boiling point:  $50^\circ\text{C}$ ), 1,2-dichlorohexafluorocyclobutane (*c*- $\text{C}_4\text{F}_6\text{H}_2$ , boiling point:  $60^\circ\text{C}$ ), and 1,1,1,3,3,3-

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hexafluoropropan-2-ol ( $\text{CF}_3\text{CH}(\text{OH})\text{CF}_3$ , boiling point:  $59^\circ\text{C}$ ).

**Claim 10 (Currently Amended):** The A process according to Claim 1 or 2, wherein the halogen-containing compound is 1,1,1,2,3,3,3-heptafluoropropane (HFC227ea:  $\text{CF}_3\text{CFHCF}_3$ ).

**Claim 11 (Currently Amended):** The A process according to Claim 1 or 2, wherein the proportion of halogen-containing compound is about 1 to about 49 mol per 100 mol of HFC-365mfc and halogen-containing compound in total.

**Claim 12 (Currently Amended):** The A process according to Claim 1 or 2, wherein the catalyst is a tertiary amine, an organometallic compound, or a mixture thereof.

**Claim 13 (Currently Amended):** An organic blowing agent for producing a synthetic resin foam, the organic blowing agent comprising 1,1,1,3,3-pentafluorobutane and at least one halogen-containing compound, the blowing agent being a mixture comprising 1,1,1,3,3-pentafluorobutane and at least one low-boiling halogen-containing compound.

wherein the organic blowing agent and the polyol mixture forms a premix which is substantially nonflammable;

wherein the at least one low-boiling halogen-containing compound has a relatively low thermal conductivity and a boiling point of about  $-90$  to about  $10^\circ\text{C}$  and the thermal conductivity of

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the halogen containing compounds in the gaseous state is about 8 to about 30 mW/mK at about 1 atmospheric pressure; and

wherein the organic blowing agent further comprises at least one member selected from the group consisting of glycol compounds and amine compounds.

**Claim 14 (Canceled)**

**Claim 15 (Currently Amended):** The A blowing agent according to Claim 13 further comprising at least one glycol compound.

**Claim 16 (Currently Amended):** The A blowing agent according to Claim 13, wherein the halogen-containing compound is 1,1,1,2,3,3,3-heptafluoropropane (HFC227ea: CF<sub>3</sub>CFHCF<sub>3</sub>).

**Claim 17 (Currently Amended):** A premix for producing a synthetic resin foam, the premix comprising 1,1,1,3,3-pentafluorobutane, at least one halogen-containing compound and at least one polyol, the blowing agent being a mixture comprising 1,1,1,3,3-pentafluorobutane and at least one low-boiling halogen-containing compound,

wherein the premix is substantially nonflammable;

wherein the at least one low-boiling halogen-containing compound has a relatively low thermal conductivity and a boiling point of about -90 to about 10°C and the thermal conductivity of

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the halogen containing compounds in the gaseous state is about 8 to about 30 mW/mK at about 1 atmospheric pressure; and

wherein the organic blowing agent further comprises at least one member selected from the group consisting of glycol compounds and amine compounds.

**Claim 18 (Canceled)**

**Claim 19 (Currently Amended):** The A premix according to Claim 17 ~~further~~ comprising at least one glycol compound.

**Claim 20 (Currently Amended):** The A premix according to Claim 17, wherein the halogen-containing compound is 1,1,1,2,3,3,3-heptafluoropropane (HFC227ea:  $\text{CF}_3\text{CFHCF}_3$ ).

**Claim 21 (Currently Amended):** The A premix according to Claim 17 ~~or 18~~ that is nonflammable.